APPENDIX D

Wet Season Road and Trail Closures

Introduction

The Eldorado NF LRMP includes a standard and guideline under Forestwide Management Practice 27 that calls for instituting a closure for motorized use of roads and trails normally open for Off Highway vehicle use during wet weather periods to reduce damage to native surface routes. This standard and guideline also calls for allowing roads and trails to be open when soil conditions permit. A wet season closure is a tool for protecting native surfaced roads and trails when they are susceptible to rutting1 and soil damage. Rutting causes direct damage to travelway treads, concentrates runoff that can lead to gully erosion, and leads to trail widening. Wet season use can also damage drainage structures such as rolling dips, waterbars, and other waterbreaks. These structures are easily damaged when soils are too wet. The primary objectives of the wet season closure are to protect the drainage structures from damage, to protect the road or trail tread from rutting and other damage, and to minimize impacts to water quality at stream crossings or where drainage off of roads or trails becomes concentrated, carrying sediment and other deleterious materials into stream courses.

ENF Weather Patterns

The ENF is situated within an area of Mediterranean climate, characterized by a rainy, wet winter season, and a dry summer season. Approximately 50 percent of the annual precipitation in the Sierra Nevada occurs during the winter, approximately 33 percent in the fall, approximately 2 percent in the summer and the remainder in the spring. Above about 7,000 feet, nearly all of the winter precipitation comes as snowfall, whereas below 3,000 feet, nearly all fall through spring precipitation comes as rainfall. Between 3,000 and 7,000 feet, fall through spring precipitation is a combination of rain and snow. Soil moisture content and soil strength differ under conditions of continuous winter snow coverage.

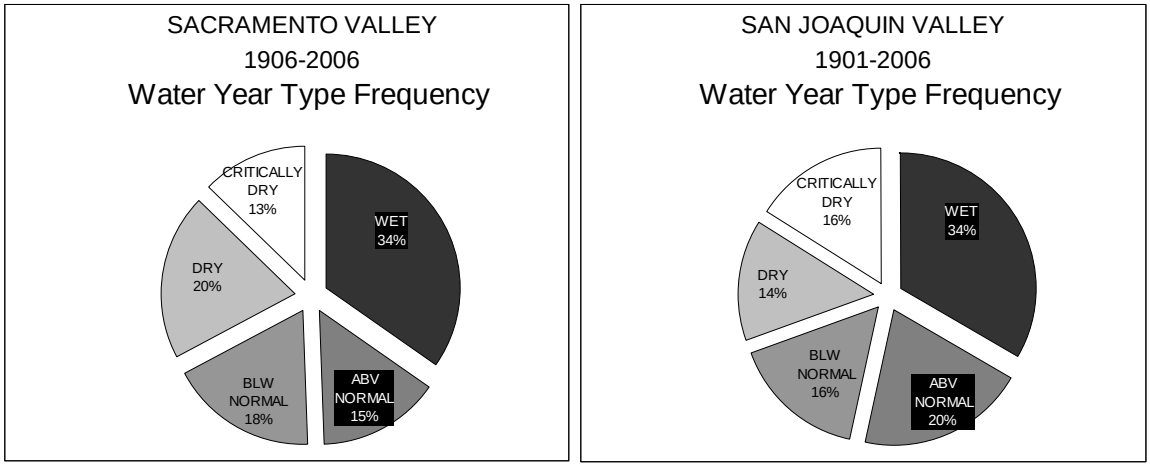
Annual precipitation in the Sierra Nevada has been divided into 5 water year types by the California Department of Water Resources, based on the amount of precipitation; critically dry (C), dry (D), below normal (BN), above normal (AN) and wet (W).

Water Year Types	Description
Wet (W)	> 125% of Average
Above Normal (AN)	< 125% of Average but >=100% of Average
Below Normal (BN)	< 100% of Average but >= 75% of Average
Dry (D)	<75% of Average but >=50% of Average
Critically Dry (CD)	< 50% of Average

[1] Rutting is the creation of furrows or

The northern portion of the ENF is situated within the southeastern portion of the Sacramento Valley watershed, whereas the southern portion of the ENF is situated within the San Joaquin Valley watershed. The following figure shows the frequency of the different water year types within these two major drainage systems. The San Joaquin River Watershed, which includes the Cosumnes and NF Mokelumne Rivers and their tributaries, is typically a little drier and warmer than the Sacramento River Watershed (American River and its tributaries). Roughly 1 of every 3 years is considered to be a wet year from the weather history over the entire forest and critically dry years occur usually once every 6-7 years.

Figure D-1. Frequency of Water Year Types



Based on a comparison of average daily precipitation during critically dry water year types, light amounts of precipitation on average begins in mid-September, and becomes more significant in early-November. Precipitation continues into late winter (late March) although the intensity of storms decreases in general later in the winter. Precipitation patterns differ during wetter water year types in various ways:

On average, the more significant fall precipitation events begin slightly earlier in wetter years,

Wetter water years often have more intense winter precipitation events,

During wetter water years, it is not uncommon to have intervals of dry weather between precipitation events.

Above normal and wet water years on average have precipitation events extending into May, whereas the dryer water year types have fewer precipitation events extending into May and they are of lesser intensity

Average daily precipitation hydrographs for each of the five water-year types are included at the end of this appendix.

Initiation of Wet Season Closure

Typically, both surface soils and subsoils are dry at the start of the fall and winter rainy season. During the first rains only the surface soil is wetted while the subsoil remains dry, and has high strength. The interface between moist and dry soil is the wetting front. As precipitation falls during the season, a portion of the moisture moves into and through the soil, increasing the depth of wetting front The characteristics of the rainfall events in the Fall period are important in determining how and when this wetting front progresses and when tread damage may occur. Early in the fall season, soils are not fully saturated, and so the soils can become compacted from

vehicle travel, rather than rutted. Since native surface road and trail treads are commonly already compacted, these surfaces take up water more slowly, and can sustain travel following early season precipitation without tread damage. In fact, early season travel can be beneficial after a light rain on a previously dry fluffy tread because it helps to compact and strengthen the tread. Based on precipitation records and typical soil moisture conditions in the central Sierra Nevada (Poff, 2007), subsurface soil moisture is sufficiently high by **January 1 in critically dry water years** such that rutting of road or trail treads occurs, along with damage to water drainage structures. In dry water years, there is additional precipitation earlier in the season, and so the date at which rutting and tread damage occurs is earlier; commonly by early December.

End of Wet Season Closure

Near the end of the winter season and into the spri

Figure D.2: Average Daily Precipitation for Critically Dry Water Year Type. Average daily precipitation is in inches.

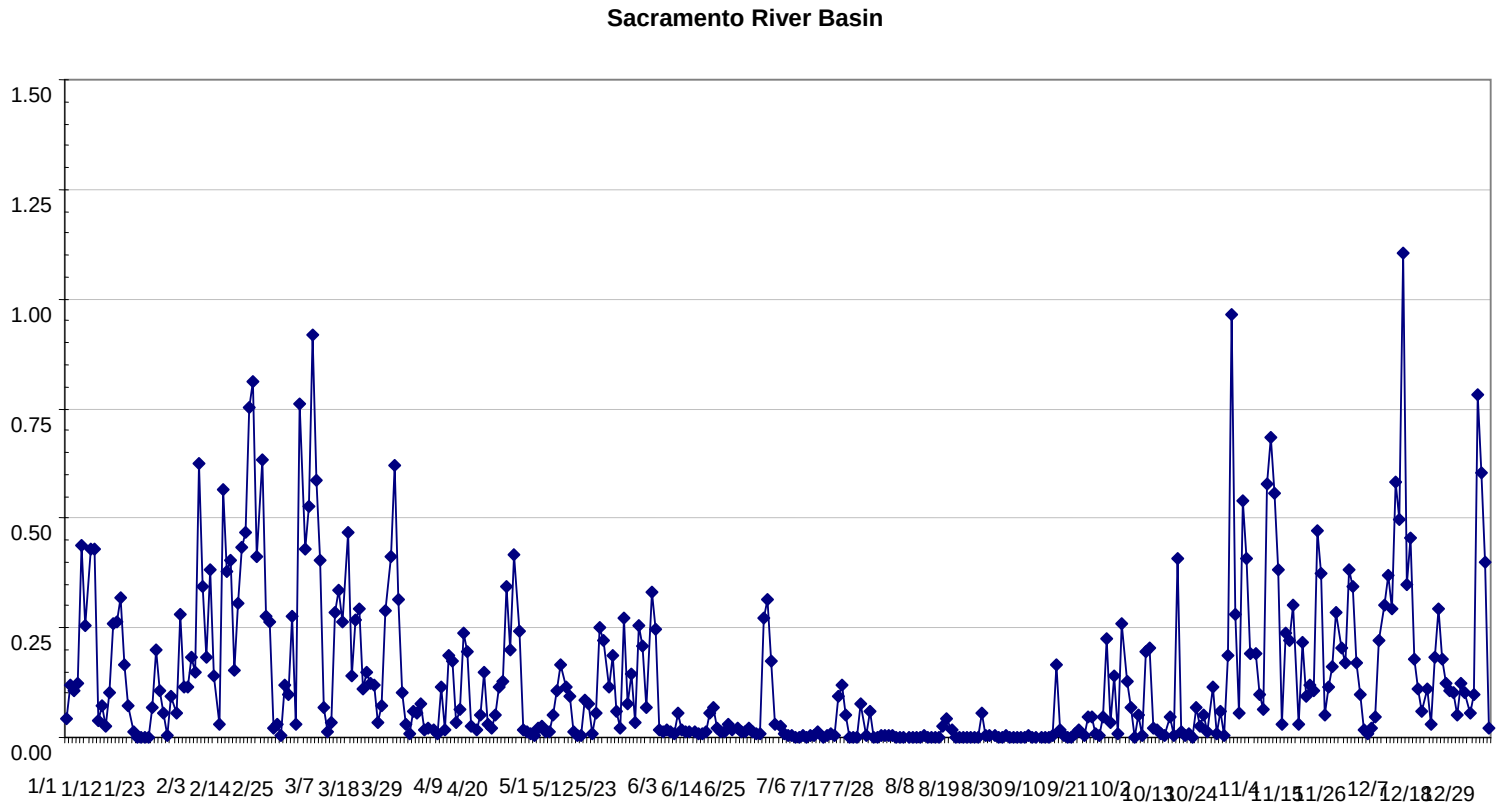


Figure D.3: Average Daily Precipitation for Dry Water Year Type. Average daily precipitation is in

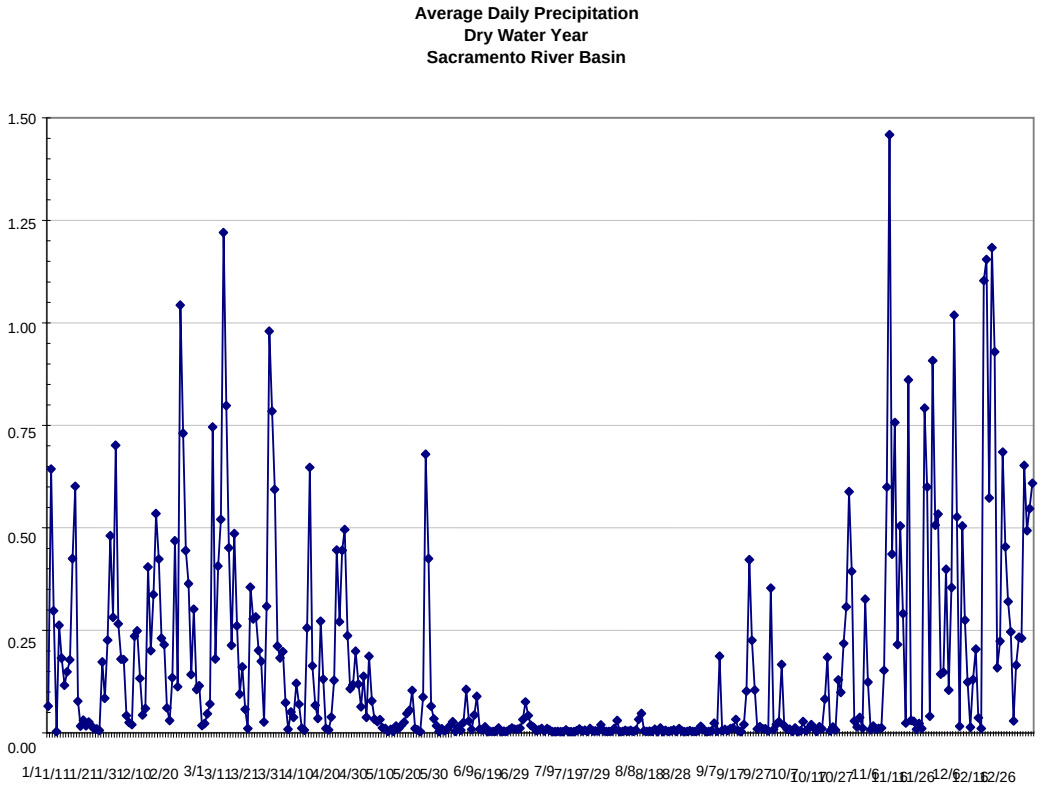


Figure D.4: Average Daily Precipitation for Below Normal Water Year Type. Average daily precipitation is in inches

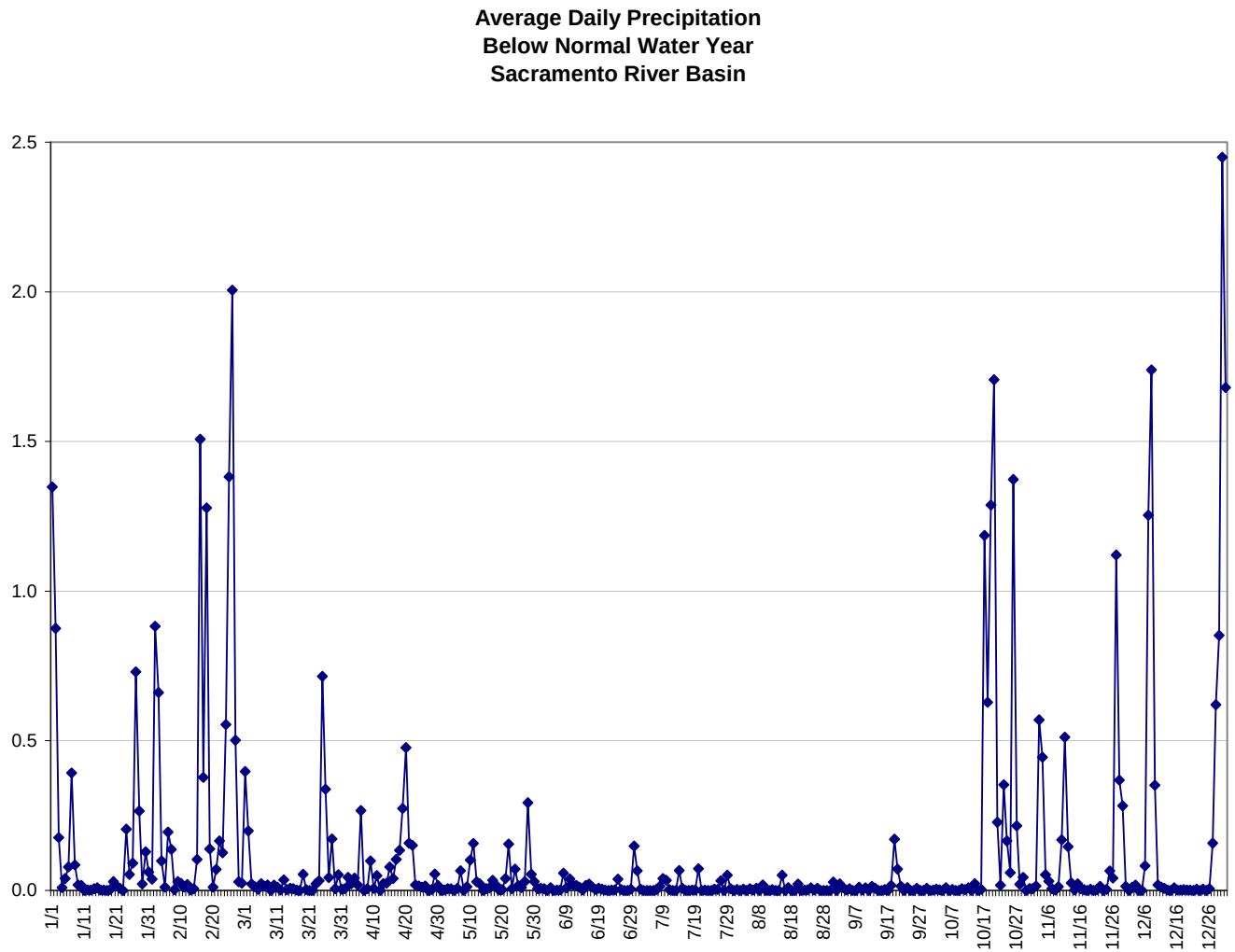


Figure D-5: Average Daily Precipitation for Above Normal Year Type. Average daily precipitation is in inches.

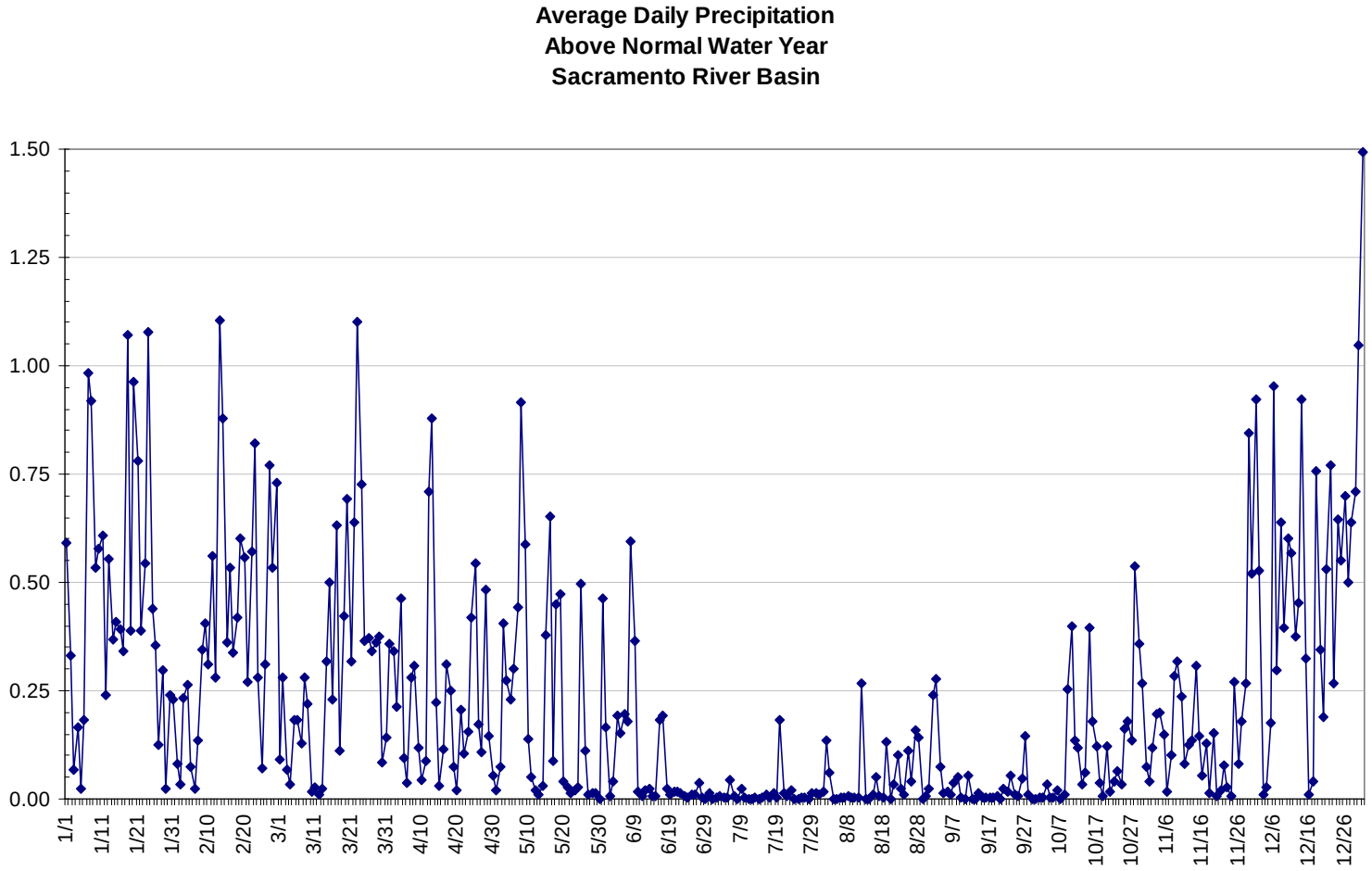


Figure D-6: Average Daily Precipitation for Wet Water Year Type. Average daily precipitation is in inches.